<u>What is claimed is:</u>

1.   A digital echo cancellation device used for a high speed bidirectional communication system, comprising:

an adaptive beamformer comprising an finite impulse response filter for estimating an input receiving signal, the adaptive beamformer

5   estimating a front portion of an echo path impulse response by adaptively estimating the input receiving signal; and

an orthogonalized infinite impulse response (IIR) filter for receiving an estimated signal output from the adaptive beamformer and estimating an tail portion of the echo path impulse on the basis of an

10   IIR.

2.   The digital echo cancellation device of claim 1, further comprising:

a first adder for subtracting the estimated signal output from the adaptive beamformer from a receiving signal to generate a first error

5   signal; and

a second adder for receiving the first error signal and subtracting the signal output from the orthogonalized IIR filter from the first error signal to generate a second error signal in which echo is canceled.

3.   A digital echo cancellation device used for a high speed bidirectional communication system, comprising:

an adaptive beamformer comprising a finite impulse response

5   filter for estimating an input receiving signal, the adaptive beamformer estimating a front portion of an echo path impulse response by adaptively estimating the input receiving signal;

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an orthogonalized infinite impulse response (IIR) filter for receiving an estimated signal output from the adaptive beamformer and estimating a tail portion of the echo path impulse response on the basis of an IIR;

a first adder for subtracting the estimated signal output from the adaptive beamformer from a received transmission signal to generate a first error signal; and

a second adder for generating a second error signal from which echo is canceled by subtracting the signal output from the IIR filter from the first error signal.

4.   The digital echo cancellation device of claim 3, wherein the orthogonalized IIR filter comprises:

a first stage comprising a first adder for receiving the estimated signal output from the adaptive beamformer and a first delay for delaying an output signal from the first adder, wherein the adder adds the estimated signal to a signal obtained by multiplying an output signal from the first delay with a coefficient r; and

a plurality of additional stages which are serially connected to each other, wherein a first one of the additional stages is connected to an output signal from the first stage and comprises a second delay for delaying the output signal from the first stage, a third delay, and a second adder for adding a signal obtained by multiplying the output signal from the first stage with a coefficient -r, an output signal of the second delay, and a signal obtained by multiplying an output signal from the third delay with the coefficient r.

5.   The digital echo cancellation device of claim 3, wherein output signals from the from each of the additional stages are

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20   multiplied by coefficients and then provided to the second adder to
      generate the second error signal.